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An Hypothetical Analysis of the Black Hills Beetle

Problem On the Dixie National Forest In Utah

by

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The Black Hills beetle outbreak on the Dixie National Forest is now at a stage where very critical analysis is desirable before a decision is reached as to whether or not additional chemical control work is justified. Unfortunately, we do not have the necessary information to enable us to predict the probable beetle population trend. We can make various assumptions and then compute the probable losses and control costs. This I have attempted to do in the following tables.

The ratios of increase used in these tables are certainly conservative for most areas. On the other hand, control costs figured at an average of $10 per tree are above the actual costs of the work conducted thus far. The greatest uncertainty thus appears to be in estimating when the outbreak will reach its peak and begin to decline. We have observed no evidence to lead us to expect a break in 1954 and we believe it will not occur before the attack period in 1955 at the earliest.

Table No. 1 indicates that the control work conducted thus far has been very profitable. However, if the break in the beetle population can be reasonably expected within the next two years (1954 or 1955) the data in Tables 2 and 3 indicate that no additional direct control should be attempted, at least on the basis of stumpage values to be protected. However, watershed values and possible disruption of an already precarious local economy may be sufficient to warrant additional control expenditures. Furthermore, as stated above, we have no reason thus far to expect the break to come in either 1954 or 1955. If it does not come before 1956 there will be no question about the need for control in 1954, as shown in Table 4. We therefore urge that chemical control be planned for at least the coming season.

The localized infestation on the Escalante District should receive special attention because it appears to be independent of the main outbreak and can be expected to increase and spread very rapidly if control work is not done in 1954.

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Table No. 1. Comparison of Probable Losses 1/ Caused by Black Hills Beetle On Dixie National Forest, With and Without Direct Control Being Applied During Entire Course of Outbreak

	With Control			Without Control	
Year of attack	No. of trees attacked	Cumulative total	Ratio of increase	No. of trees attacked	Cumulative total
1950	5,030 2/	5,030		5,030	5,030
1951	2,410 2/	7,440	2:1	10,060	15,090
1952	5,090 2/	12,530	3:1	30,180	45,270
1953	5,745 3/	18,275	3:1	90,540	135,810
1954	5,000 4/	23,275	2:1	181,080	316,890
1955	3,000 4/	26,275	2:1	362,160	679,050
1956	200 4/5/	26,475	1:1	362,160	1,041,210
1957	100 4/5/	26,575	0.1:1	36,216	1,077,426
1958	100 4/5/	26,675	0.05:1	1,810	1,079,236

1/ Most of the figures used are theoretical but are believed to be conservative.

2/ Infested trees actually treated or salvaged in year following year of attack. Actual loss somewhat greater because of infested trees missed by treating crews and infested trees in areas where the number of such trees did not appear to warrant control work.

3/ Survey estimate, fall of 1953.

4/ Estimated.

5/ No direct control needed.

Using the figures in Table 1, we can make the following comparison of losses in timber volume and dollar value:

1. With direct control being applied through 1956 --
   26,675 X 250 bd. ft. = 6,668,750 bd. ft. of timber killed.
   6,668 X $8 = $ 53,344 or stumpage value of timber killed.
   26,275 X $10 = $262,750 or cost of direct control through 1955.
   $316,094 or total direct loss.

2. Without direct control being applied at any time --
   1,079,236 X 200 bd. ft. = 215,847,200 bd. ft. of timber killed.
   215,847 X $8 = $1,726,776 or stumpage value of timber killed.

$1,726,776 - loss without any direct control.
316,094 - loss with direct control through 1955.
$1,410,682 - probable saving by applying control.

Table No. 2. Comparison of Probable Losses 1/ Caused by Black Hills Beetle On Dixie N. F., With and Without Direct Control Being Applied During the Expected Remaining Years of the Present Outbreak, Assuming Break Will Occur In 1954.

	With Control			Without Control After 1953	
Year of attack	No. of trees attacked	Cumulative total	Ratio of increase	No. of trees attacked	Cumulative total
1950	5,030 2/	5,030			5,030
1951	2,410 2/	7,440			7,440
1952	5,090 2/	12,530			12,530
1953	5,745 3/	18,275		5,745	18,275
1954	5,000 4/	23,275	2:1	11,490	29,765
1955	2,000 4/5/	25,275	1:1	11,490	41,255
1956	200 4/5/	25,475	0.1:1	1,149	42,404
1957	100 4/5/	25,575	0.1:1	100	42,504

1/ Most of the figures used are theoretical but are believed to be conservative.
2/ Infested trees actually treated or salvaged in year following year of attack.
3/ Survey estimate, fall of 1953.
4/ Estimated.
5/ No direct control needed.

Using figures from Table No. 2, a comparison of expected losses for the balance of the present outbreak period is as follows:

1. With direct control continued through 1955 --
   12,945 X 250 bd. ft. = 3,236,250 bd. ft. of additional timber killed, 1953-57.
   3,236 X $8 = $25,888 or stumpage value.
   10,745 X $10 = $107,450 or cost of additional control work.
   $133,338 total additional loss, 1953-57.

2. Without direct control for balance of outbreak period --
   42,504 trees, probable total killed by end of outbreak.
   12,530 trees, killed prior to 1953.
   29,974 trees, probable additional kill before end of outbreak.
   29,974 X 250 bd. ft. = 7,493,500 bd. ft.
   7,493 X $8 = $59,944 or stumpage value of additional timber that may be lost if no further direct control is attempted after 1953.

$133,338 additional loss if control is applied.
59,944 " " " no control is applied.
$ 73,394 saving by not continuing control after 1953.

Table No. 3. Comparison of Probable Losses 1/ Caused by the Black Hills Beetle On the Dixie N. F., With and Without Direct Control Being Applied During the Expected Remaining Years of the Present Outbreak, Assuming Break Will Occur In 1955.

	With Control			Without Control After 1953	
Year of attack	No. of trees attacked	Cumulative total	Ratio of increase	No. of trees attacked	Cumulative total
1950	5,030 2/	5,030			5,030
1951	2,410 2/	7,440			7,440
1952	5,090 2/	12,530			12,530
1953	5,745 3/	18,275		5,745	18,275
1954	6,000 4/	24,275	3:1	17,235	35,510
1955	5,000 4/	29,275	2:1	34,470	69,980
1956	2,000 4/5/	31,275	1:1	34,470	104,450
1957	100 4/5/	31,375	0.1:1	3,447	107,897
1958	100 4/5/	31,475	0.1:1	344	108,241

1/ Most of the figures used are theoretical but are believed to be conservative.
2/ Infested trees actually treated or salvaged in year following year of attack.
3/ Survey estimate, fall of 1953.
4/ Estimated.
5/ No direct control needed.

Using figures from Table No. 3, a comparison of expected losses for the balance of the present outbreak period is as follows:

1. With direct control continued through 1956 --

18,945 X 250 bd. ft. = 4,736,250 bd. ft. of additional timber killed, 1953-58.
4,736 X $8 = $ 37,888 or stumpage value.
16,745 X $10 = 167,450 or cost of additional control work.
$205,338 or total additional loss 1953-58.

2. Without direct control for balance of outbreak period --

108,241 trees, probable total killed by end of outbreak.
12,530 trees, killed prior to 1953.
95,711 trees, probable additional kill before end of outbreak.
95,711 X 250 bd. ft. = 23,927,750 bd. ft.
23,928 X $8 = $191,424 or stumpage value of additional timber that may be killed if no further direct control is attempted after 1953.

$205,338 additional loss with control continued through 1956.
191,424 additional loss with no control after 1953.
$ 13,914 amount saved by not continuing direct control after 1953.

Table No. 4. Comparison of Probable Losses 1/ Caused by the Black Hills Beetle On the Dixie N. F., With and Without Direct Control Being Applied During the Expected Remaining Years of the Present Outbreak, Assuming Break Will Occur In 1956.

	With Control			Without Control After 1953	
Year of attack	No. of trees attacked	Cumulative total	Ratio of increase	No. of trees attacked	Cumulative total
1950	5,030 2/	5,030			5,030
1951	2,410 2/	7,440			7,440
1952	5,090 2/	12,530			12,530
1953	5,745 3/	18,275		5,745	18,275
1954	6,000 4/	24,275	3:1	17,235	35,510
1955	6,500 4/	30,775	3:1	51,705	87,215
1956	5,000 4/	35,775	2:1	103,410	190,625
1957	2,000 4/5/	37,775	1:1	103,410	294,035
1958	100 4/5/	37,875	0.1:1	10,341	304,376
1959	100 4/5/	37,975	0.1:1	1,034	305,410

1/ Most of the figures used are theoretical but are believed to be conservative.

2/ Infested trees actually treated or salvaged in year following year of attack.

3/ Survey estimate, fall of 1953.

4/ Estimated.

5/ No direct control needed.

Using the figures from Table No. 4, a comparison of expected losses for the balance of the present outbreak period is as follows:

1. With direct control continued through 1954-57 --

25,445 X 250 bd. ft. = 6,361,250 bd. ft. of additional timber killed, 1953-59.

6,361 X $6 = $ 50,888 or stumpage value.
23,245 X $10 = 232,450 or cost of additional control work.
$283,338 or total additional loss, 1953-59.

2. Without direct control for balance of outbreak period --

305,410 trees, probable total killed by end of outbreak.
12,530 trees, killed prior to 1953.
292,880 trees, probable additional kill before end of outbreak.

292,880 X 250 bd. ft. = 60,040,400 bd. ft.
60,040 X $8 = $480,320 or stumpage value of additional timber that may be killed if no further direct control is attempted after 1953.

$480,320 additional loss with no control after 1953.
283,338 additional loss with control continued through 1957.
$196,982 amount saved by continuing control through 1957.